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Notice of Allowability

Application No.

10/723,045

Examiner

Nicholas A. Smith

Applicant(s)

UZOH ET AL.

Art Unit

1742

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 28 September 2006.
2. ☒ The allowed claim(s) is/are 16-20 and 22-26.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|--|--|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date _____. |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____ | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other _____. |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments, see p. 5, line 26 to p. 6, line 10, filed 28 September 2006, with respect to claim 16 have been fully considered and are persuasive. The rejection under 35 USC 102(e) as being anticipated by Mayer et al. (US Patent 6,572,920) of claims 16-26 has been withdrawn. Applicant's arguments, see p. 6, line 21 to p. 6, line 28, filed 28 September 2006, with respect to claim 16 have been fully considered and are persuasive. The rejection on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1 and 8-9 of US Patent 6,695,962, Uzoh et al., in view of Mayer et al. (US Patent 6,572,920) of claims 16-26 has been withdrawn.

Election/Restrictions

2. Applicant's election without traverse of claims 16-20 and 22-26 in the reply filed on 28 September 2006 is acknowledged. This application is in condition for allowance except for the presence of claims 1-15 directed to an invention non-elected without traverse. Accordingly, claims 1-15 have been cancelled.

Status of Claims

3. Claims 16-20 and 22-26 remain for examination. Claims 1-15 and 21 have been cancelled.

Allowable Subject Matter

4. Claims 16-20 and 22-26 are allowed.

5. The following is an examiner's statement of reasons for allowance: Mayer et al. does not disclose, teach or suggest an upper inlet port coupled to the solution housing

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configured to deliver the process solution to the upper chamber of the solution housing to fill the upper chamber and the lower chamber immersing the electrode in the lower chamber. Mayer et al.'s port (Mayer et al., Figure 4B, **460**) is coupled to a wall (Mayer et al., Figure 4B, **468**) of an intermediate chamber (Mayer et al., Figure 4B, **464**).

Furthermore, an introduction of an upper inlet port coupled to the solution housing would not be consistent with Mayer et al. Mayer et al. teaches away from such a port in that a second filter element (Mayer et al., Figure 4B, **466**) is situated to cause uniform flow and uniform plating (Mayer et al., col. 13, lines 35-43). Flow from an upper inlet port coupled to the solution housing configured to deliver the process solution to the upper chamber of the solution housing to fill the upper chamber would destroy uniform flow in the upper chamber (Mayer et al., Figure 4B, volume between **466** and **470**).

Furthermore, US Patent 6,695,962 (Uzoh et al. '962), of which this application is a continuation-in-part, does not claim an inlet port coupled to the solution housing configured to deliver the process solution to the upper chamber of the solution housing to fill the upper chamber and the lower chamber immersing the electrode in the lower chamber and addition of such a port is not obvious to one of ordinary skill in the art.

6. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

EXAMINER'S AMENDMENT

7. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

8. Authorization for this examiner's amendment was given in a telephone interview with Tina Chen on 8 December 2006.

9. The application has been amended as follows:

a. Paragraph [0001] of the specification now reads: "This application claims priority to Provisional Application Serial No. 60/429,083 filed November 26, 2002. This application is a continuation in part of: U.S. Patent Application No. 09/845,262, now U.S. Patent No. 6,695,962, filed May 1, 2001 which is a continuation in part of U.S. Patent No. 6,478,936; and US Application No. 09/760,757, now U.S. Patent No. 6,610,190, filed January 17, 2001, all incorporated herein by reference."

b. Paragraph [0006] of the specification now reads: "The importance of overcoming the various deficiencies of the conventional electrodeposition techniques is evidenced by technological developments directed to the deposition of planar copper layers. For example, U.S. Patent No. 6,176,992, entitled Method and Apparatus for Electrochemical Mechanical Deposition, commonly owned by the assignee of the present invention, describes in one aspect an electrochemical mechanical deposition technique (ECMD) that

achieves deposition of the conductive material into the cavities on the substrate surface while minimizing deposition on the field regions by polishing the field regions with a pad as the conductive material is deposited, thus yielding planar copper deposits. U.S. Patent 6,482,307 entitled Method and Apparatus for Making Electrical Contact to Wafer Surface for Full-Face Electroplating or Electropolishing, filed on December 14, 2000, describes in one aspect a technique for providing full-face electroplating or electropolishing. U.S.

Application No. 09/760,757, now U.S. Patent No. 6,610,190, entitled Method and Apparatus for Electrodeposition of Uniform Film with Minimal Edge Exclusion on Substrate, filed on January 17, 2001, describes in one aspect a technique for forming a fiat conductive layer on a semiconductor wafer surface without losing space on the surface for electrical contacts.”

c. Paragraph [0007] of the specification now reads: “In such above-mentioned processes, a pad or a mask, which may also be collectively referred to as workpiece surface influencing devices, can be used during at least a portion of the electrodeposition process when there is physical contact between the workpiece surface and the pad or the mask. The physical contact or the external influence by the pad or the mask affects the growth of the metal by reducing the growth rate on the top surface while effectively increasing the growth rate within the features. This aspect is described in U.S. Patent Application No. 09/740,701, now U.S. Patent No. 6,534,116, entitled Plating Method and Apparatus that

creates a Differential Between Additive Disposed on a Top Surface and Cavity Surface of a Work Piece Using an External Influence, filed December 18, 2000.”

d. Paragraph [0014] of the specification now reads: “Several designs of anode assemblies have been disclosed. U.S. Patent 6,261,433 describes an anode for copper plating, where copper electrolyte is pumped through copper particles, which are encased in a porous enclosure. U.S. Patent 6,365,017 describes a plating apparatus comprising an ion exchange film or neutral porous diaphragm dividing the plating bath into a substrate region and anode region. Circulation means are provided to circulate the solution in both regions. U.S. Patent 6,126,798 provides an anode including an anode cup, a filter and ion source material, the anode cup and filter forming an enclosure in which the ion source material is located. U.S. Patent Application No. 09/845,262, now U.S. Patent No. 6,695,962, entitled, Anode Designs for Planar Metal Deposits with Enhanced Electrolyte Solution Blending and Process of Supplying Electrolyte Solution Using Such Designs, filed May 1, 2001 discloses a design that includes two filter elements defining an anode chamber containing the anode, and a blending chamber. The solution emanating from the anode chamber through a primary anode filter mixes with the solution delivered directly to the blending chamber. The mixed solution is then delivered to the substrate surface through a secondary filter.”

e. Paragraph [0069] of the specification now reads: “Figure 11 illustrates, in perspective view, an exemplary Electrochemical Mechanical Processing

(ECMPR) system 900 using the reverse solution flow of the present invention in anode housing 902. In this embodiment, the housing may have a rectangular shape having one lateral dimension which is shorter than the other lateral dimension. For example, Figure 12 shows a side view along the longer lateral dimension of the housing 902. One such rectangular anode housing design is exemplified in US Application No. 09/760,757, now U.S. Patent No. 6,610,190, entitled, Method and Apparatus For Electrodeposition of Uniform Film on Substrate, filed January 17, 2001 and commonly owned by the assignee of the present invention. Referring to Figures 11 and 12, surface 904 of a wafer 906 is placed in proximity of top surface 907 of a workpiece surface influencing device 908 of the system 900. The workpiece surface influencing device (WSID) 908 has a rectangular shape and encloses the top opening 909 of the housing. This rectangular design of the WSID and the housing allow electrical contacts 913 to touch the edge of the wafer. During the plating process, a potential difference between the anode and the electrical contacts is established using a power supply 915. A plating solution 910 fills the housing 902 and flows through channels 911 while contacting both the surface of the wafer and an anode 912 which is placed on bottom wall 914 of the housing 902. The anode 912 is kept submerged in the plating solution that fills the anode housing. The anode 912 has a rectangular shape corresponding to the shape of the WSID 908 to establish deposition uniformity over the entire surface of the WSID. During the

process wafer is held and moved, i.e., rotated and laterally moved by a workpiece carder head 917."

f. Claim 26 now reads: "The system of Claim 16, wherein the first or the second filter element is configured to guide bubbles to an outlet port."

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nicholas A. Smith whose telephone number is (571)-272-8760. The examiner can normally be reached on 8:30 AM to 5:00 PM, Monday through Friday.

11. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571)-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

12. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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